1. Voluntary Reporting of Emission Reduction Actions: An Overview

Introduction

The Energy Policy Act of 1992 (EPACT) directed the Energy Information Administration (EIA) to develop a program to document voluntary actions that reduce emissions of greenhouse gases or remove them from the atmosphere (see box on page 2).[1] The Voluntary Reporting of Greenhouse Gases Program was developed in cooperation with the Office of Policy, U.S. Department of Energy (DOE), and with the U.S. Environmental Protection Agency (EPA). Voluntary reporting of emission mitigation initiatives can help identify innovative actions that can spur imitation and widespread replication.

To date, U.S. policy initiatives to promote progress toward the goal of stabilizing U.S. greenhouse gas emissions have emphasized voluntary approaches. President Clinton's Climate Change Action Plan sought to energize cooperative approaches to identify and implement actions that could reduce emissions of greenhouse gases.[2] In that spirit, an array of government/industry partnerships were formed to search for and pursue opportunities to mitigate greenhouse gas emissions. Most of the reporters to the Voluntary Reporting Program are affiliated with one or more government-sponsored voluntary programs.

This report presents information on the fourth reporting cycle of the Voluntary Reporting Program. The reports received in 1998 included information on emissions, emission reductions, and carbon sequestration activities through 1997. Reports were received from 156 volunteers describing 1,229 projects that either reduce greenhouse gas emissions or sequester carbon. The projects relate to emissions of carbon dioxide from energy production and use; methane and nitrous oxide emissions from energy use, waste management, and agricultural processes; emissions of a variety of halocarbons; and actions that increase carbon sequestration. Current reporters represent 18 different industries, as defined by the two-digit Standard Industrial Classification (SIC) code. Although most are electric utilities, representation from other sectors is significant and increasing, including large enterprises in the automotive, metals, mining, chemicals, petroleum, and computer industries.

This report is divided into seven chapters. This chapter provides an overview of participation in the Voluntary Reporting Program, a perspective on the composition of activities reported, and a review of some key issues in interpreting and evaluating achievements associated with reported emission mitigation initiatives. Chapters 2 through 6 provide a more detailed review of the variety of project-level emission reduction initiatives reported to the program. Chapter 2 examines projects in the electricity sector involving energy efficiency improvements in power production and distribution and reductions in the use of higher emitting carbon-based fuels. Chapter 3 considers improvements in end-use efficiency and fuel switching in the residential, commercial, industrial, and transportation sectors. Activities to improve or expand carbon sinks, notably through reforestation and afforestation, are the subject of Chapter 4. Emission reduction initiatives associated with methane and halogenated substances are examined in Chapters 5 and 6, respectively. Chapter 7 reviews emissions reports from participants who provided data on aggregate entity emissions. A total of 56 reporters, including most of the largest electric utilities in the United States, provided information on aggregate emissions or aggregate reductions. Appendixes provide information on the development and structure of the data collection instrument, a discussion of issues in the interpretation of the data, and summary lists of reporters and projects.

The reports submitted to EIA have been compiled into a database that can be obtained on CD-ROM by contacting the Voluntary Reporting of Greenhouse Gases Program Communications Center at 1-800-803-5182 or can be downloaded from EIA's World Wide Web site at *http://www.eia.doe.gov/oiaf/1605/ftphlp.html*.

[1]Title XVI of the Energy Policy Act, Public Law 102-486 (October 24, 1992), in Section 1605(a) called for an annual report on national aggregate emissions of greenhouse gases. EIA has issued the report—*Emissions of Greenhouse Gases in the United States*—every year since 1993. Section 1605(b) called for the establishment of a database on annual reductions of emissions as reported on a voluntary basis.

[2]U.S. Department of State, *Climate Action Report*, Publication 10496 (Washington, DC, July 1997), http://www.state.gov/www/global/oes/97climate_report/index.html.

The Energy Policy Act of 1992, Sections 1605(b) and (c)

(B) Voluntary Reporting.—

(1) ISSUANCE OF GUIDELINES.—Not later than 18 months after the date of the enactment of this Act, the Secretary shall, after opportunity for public comment, issue guidelines for the voluntary collection and reporting of information on sources of greenhouse gases. Such guidelines shall establish procedures for the accurate voluntary reporting of information on—

(A) greenhouse gas emissions—

(i) for the baseline period of 1987 through 1990; and

(ii) for subsequent calendar years on an annual basis;

(B) annual reductions of greenhouse gas emissions and carbon fixation achieved through any measures, including fuel switching, forest management practices, tree planting, use of renewable energy, manufacture or use of vehicles with reduced greenhouse gas emissions, appliance efficiency, methane recovery, cogeneration, chlorofluorocarbon capture and replacement, and power plant heat rate improvement;

(C) reductions in greenhouse gas emissions achieved as a result of—

(i) voluntary reductions;

(ii) plant or facility closings; and

(iii) State or Federal requirements; and

(D) an aggregate calculation of greenhouse gas emissions by each reporting entity.

Such guidelines shall also establish procedures for taking into account the differential radiative activity and atmospheric lifetimes of each greenhouse gas.

(2) REPORTING PROCEDURES.—The Administrator of the Energy Information Administration shall develop forms for voluntary reporting under the guidelines established under paragraph (1), and shall make such forms available to entities wishing to report such information. Persons reporting under this subsection shall certify the accuracy of the information reported.

(3) CONFIDENTIALITY.—Trade secret and commercial or financial information that is privileged or confidential shall be protected as provided in section 552(b)(4) of title 5, United States Code.

(4) ESTABLISHMENT OF DATA BASE.—Not later than 18 months after the date of the enactment of this Act, the Secretary through the Administrator of the Energy Information Administration shall establish a data base comprised of information voluntarily reported under this subsection. Such information may be used by the reporting entity to demonstrate achieved reductions of greenhouse gases.

(C) Consultation.—

In carrying out this section, the Secretary shall consult, as appropriate, with the Administrator of the Environmental Protection Agency.

Who Reported?

Reports for the 1997 data year were received from 156 participants in 18 different industries or services. In comparison, reports for the 1994 data year were received from 108 participants in 9 different industries or services (Table 1). Most reporters were utilities actively involved in the production and distribution of electricity. Electric utilities accounted for 111 of the entities reporting in each of the last two reporting cycles; however, their share of the total reports received fell slightly, from 74 percent for 1996 to 71 percent for 1997 (Figure 1). Although the number of reporters from other industries remained relatively small, in many cases reports were received from key companies in those industries: for example, General Motors in the automotive products industry, Noranda and an operating division of Alcan in the metals industry, Peabody in the coal mining industry, BP America in the petroleum industry, and IBM in the electronic equipment industry. A complete listing of all reporters is provided in Appendix C, Table C1.

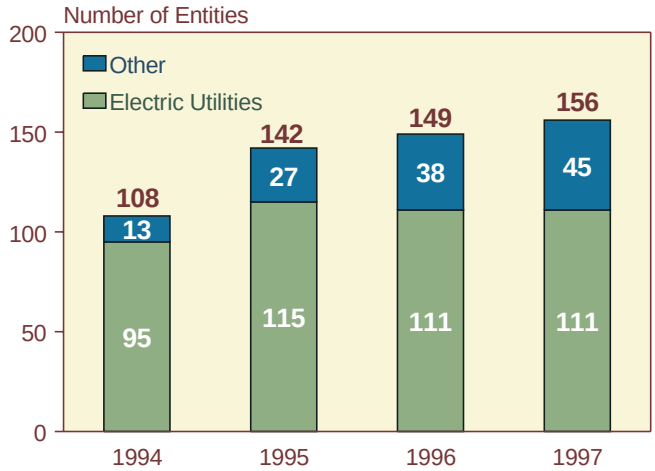
Most reporters indicated that their projects were affiliated with one or more government-sponsored voluntary programs. Of the 1,229 projects reported for 1997, 870 were affiliated with the Climate Challenge Program, 41 with the Climate Wise Recognition Program, 24 with EPA's Green Lights Program, 32 with the U.S. Initiative on Joint Implementation, 30 with the Landfill Methane Outreach Program, 18 with Energy Star Buildings, and 6 with the Natural Gas STAR Program. Other voluntary programs cited included Energy Star Computers,

Table 1. Forms Filed by Standard Industrial Classification, Data Years 1994-1997
(Number of Reports)

SIC Code	Description	Data Year			
		1994	1995	1996	1997
08	Forestry	1	2	1	1
12	Coal Mining	1	2	2	1
27	Printing and Publishing	0	1	0	1
28	Chemical and Allied Products	1	3	2	2
29	Petroleum Refining and Other Related Industries	0	0	2	3
32	Stone, Clay, Glass, and Concrete Products	0	0	2	1
33	Primary Metals	2	2	4	4
34	Fabricated Metal Products, Except Machinery and Transportation Equipment	0	2	1	1
36	Electronic Equipment	1	1	2	4
37	Transportation Equipment	1	1	1	2
38	Miscellaneous Manufacturing Industries	0	1	1	0
49	Electric, Gas, and Sanitary Services	98	123	124	127
65	Real Estate	0	1	1	1
67	Holding and Other Investment Offices	0	0	1	1
82	Educational Services	1	2	2	2
86	Membership Organizations	0	0	0	1
87	Engineering and Management Services	0	0	2	2
88	Private Households	2	1	1	1
89	Services Not Elsewhere Classified	0	0	0	1
Total		**108**	**142**	**149**	**156**

Source: Energy Information Administration, Forms EIA-1605 and EIA-1605EZ.

Figure 1. Electric Utilities and Other Entities Submitting Reports to the Voluntary Reporting of Greenhouse Gases Program, Data Years 1994-1997



Source: Energy Information Administration, Forms EIA-1605 and EIA-1605EZ.

Energy Star Transformers, the Voluntary Aluminum Industrial Partnership, Motor Challenge, WasteWi$e, the Coalbed Methane Outreach Program, and the Cool Communities Program. Not all participants in the various voluntary programs provided information to the Voluntary Reporting Program.

Twenty-seven entities that had filed reports in one or more of the previous reporting cycles did not report for 1997. Most of them had filed their reports on the short form (Form EIA-1605EZ), and they did not represent a significant proportion of the total emissions, emission reductions, or carbon sequestration reported.

What Was Reported?

The data collection program for emission mitigation actions is highly flexible. At one extreme, participants can limit their reporting to a single project. At the other extreme, a report can include multiple projects placed in the context of the reporter's aggregate or "entity-level" emissions inventory.

Of the 156 reporters, 145 (93 percent) provided information on a total of 1,229 projects. A total of 56 reporters, including most of the largest electric utilities in the United States, submitted aggregate emissions or emission reduction data, and 11 reported only aggregate data, without providing specific information on mitigation actions (Table 2). The total number of projects reported increased by 191, or 18 percent, compared with the previous reporting cycle (Table 3). Most projects

Table 2. Distribution of Projects by Reduction Objective and Project Type, Data Year 1997

Reduction Objective and Project Type	Number of Projects	Number of Reporters
Reducing Carbon Dioxide Emissions	**715**	**112**
Electricity Generation, Transmission, and Distribution	360	90
Cogeneration and Waste Heat Recovery	20	14
Energy End Use	273	87
Transportation and Offroad Vehicles	62	37
Reducing Methane and Nitrous Oxide Emissions	**100**	**44**
Waste Treatment and Disposal (Methane)	79	30
Agriculture (Methane and Nitrous Oxide)	3	2
Oil and Natural Gas Systems and Coal Mining (Methane)	18	14
Carbon Sequestration	**302**	**74**
Halogenated Substances	**30**	**21**
Other Emission Reductions	**82**	**53**
Entity-Level Reporting (No Projects)	**0**	**11**
Total	**1,229**	**156**

Note: The total number of reporters is smaller than the sum of the numbers of reporters for each project type, because most reporters provided information on more than one project.
Source: Energy Information Administration, Forms EIA-1605 and EIA-1605EZ.

Table 3. Geographic Scope of Reports Received and Location of Emission Reductions Projects, Data Years 1994-1997

Geographic Scope	Reports Received				Projects Reported			
	1994	1995	1996	1997	1994	1995	1996	1997
U.S. Only	102	124	124	125	636	931	1,005	1,160
Foreign Only	2	2	1	1	9	36	33	69
Both U.S. and Foreign	4	16	24	30	NA	NA	NA	NA
Total	**108**	**142**	**149**	**156**	**645**	**967**	**1,038**	**1,229**

NA = not applicable.
Source: Energy Information Administration, Forms EIA-1605 and EIA-1605EZ.

involve actions within the United States; however, some are foreign based, designed to test various concepts of joint implementation with other nations. Fifty-three of the 69 foreign projects represent shares in two forestry programs in Belize and Malaysia sponsored by the U.S. electric utility industry.

Most of the 1,038 projects reported for 1996 were also among the 1,229 projects reported for 1997, because they continued to yield emission reductions. Projects often yield emission reductions over an extended period of time; for example, an availability improvement project at a nuclear power plant typically involves the adoption of new maintenance and refueling programs that, once in place, are followed over a multi-year period. The project may even involve no new activity. The reforestation of an area in one year can result in the sequestration of carbon in many subsequent years, even if no additional trees are planted. Reporters continue to report the annual emission reductions and carbon sequestration achieved by such long-lived projects on a yearly basis.

About one-third of all the project activity relates to electricity generation, transmission, and distribution. About 250 projects improved power generation heat rates or reduced energy losses associated with transmission and distribution. Another 119 projects increased reliance on non-carbon or low-carbon fuels for generation. The largest reported emission reductions came from projects that improved the performance of nuclear power plants and thus reduced coal-fired generation. Other carbon-reducing projects used wind power or biomass for electricity generation.

Many projects (335) designed to reduce emissions from energy end use by both stationary and mobile sources were also reported, most of them by electric utilities. Projects affecting stationary sources include an array of demand-side management efforts to replace inefficient equipment and improve building shell integrity. Projects reported by industrial firms include motor drive replacement; integrated control of heating, cooling, and lighting systems; and cogeneration. Many utilities

reported multiple projects affecting both supply and consumption of energy.

Sixty-two projects affecting transportation fuel use were reported. Slightly more than half (53 percent) promoted substitution of alternative fuels for gasoline. Natural gas conversions were the most numerous. From an emission reduction perspective, the single largest project involved the replacement of conventional steel railroad cars used for transporting coal with lightweight cars made of aluminum, which reduced fuel consumption per ton of coal shipped. Also reported were projects that reduced the demand for transportation services, including a program at a printing concern which ensured that its delivery trucks were rerouted to pick up raw materials and supplies rather than returning empty; using videoconferencing to reduce travel between corporate facilities for meetings; and a variety of programs to reduce emissions associated with employee commuting, such as carpooling, vanpooling, and mass transit subsidies.

Among the remaining projects reported, those designed to improve carbon sinks were most numerous. A wide variety of forestry projects were identified. Of those undertaken in the United States, 20 percent involved urban tree planting, and 73 percent involved reforestation or afforestation. One or more such projects were undertaken in each of 44 States. Although utilities sponsored most of the projects, substantial activity was reported by a nonprofit organization. Sixty-one foreign forestry projects were also reported in nine different countries (Table 3).

A variety of efforts to reduce methane emissions and the emissions of other gases with high global warming potential were also reported. (For a discussion of global warming potential, see "What Are Greenhouse Gases?" on page 6.) One hundred projects to reduce methane emissions in 1997 were reported, with most (82 percent) capturing methane from waste in landfills, wastewater treatment, or animal husbandry. The recovered methane usually was burned to generate electricity. The largest methane reduction related to waste treatment was associated with a large waste diversion project reported by the Integrated Waste Services Association (IWSA) on behalf of 65 of the Nation's waste-to-energy facilities. IWSA estimated that, by burning rather than landfilling municipal solid waste, emissions of 145,000 metric tons of methane were avoided in 1997. Other projects reduced fugitive emissions from coal mining and natural gas production and delivery. The largest overall methane emission reduction was reported for a coal mine degasification project that eliminated 228,000 metric tons of emissions in 1997.

As shown in Table 4, projects having the principal objective of reducing carbon dioxide emissions accounted for most of the emission reductions (79 percent of the carbon dioxide equivalent) reported for 1997. Many achieved small reductions in emissions of other gases. For example, projects involving fuel switching to residual biomass fuels and those that involved recycling also reported reductions in methane that otherwise would have been emitted as a result of anaerobic decomposition of waste materials.

Table 4. Summary of Project-Level Emission Reductions and Carbon Sequestration by Reduction Objective, Data Year 1997
(Metric Tons Carbon Dioxide Equivalent)

Gas	Reductions by Primary Project Objective				Total Reductions
	Reduce Carbon Dioxide Emissions	Reduce Methane and Nitrous Oxide Emissions	Increase Carbon Sequestration	Reduce Emissions of High-GWP Gases	
Carbon Dioxide	129,504,634	2,291,784	9,691,464	0	**141,487,882**
Methane	1,080,298	18,552,734	0	0	**19,633,032**
Nitrous Oxide	218,342	6,187	0	0	**224,529**
PFCs	3,910	0	0	3,669,730	**3,673,641**
Other Gases	0	0	0	556,345	**556,345**
Total	**130,807,184**	**20,850,705**	**9,691,464**	**4,226,076**	**165,575,429**
CFCs, HCFCs	0	0	0	80,864	**80,864**

Notes: Totals include all emission reductions reported. No attempt has been made to correct for double counting, where more than one entity has (or may have) reported on the same emission reduction project. "Other Gases" includes SF_6 and HFCs. CFCs and HCFCs are not included in the totals because of the uncertainty associated with estimates of their net global warming potential. Their direct warming effects (radiative forcing) are offset by indirect cooling effects (destruction of stratospheric ozone, another greenhouse gas). The values shown for CFCs and HCFCs reflect direct warming effects only.
Source: Energy Information Administration, Forms EIA-1605 and EIA-1605EZ.

What Are Greenhouse Gases?

Many chemicals found in the Earth's atmosphere act as "greenhouse gases," which tend to be transparent to sunlight radiated largely in the visible and ultraviolet spectra but absorb infrared radiation (heat) that is radiated back into the atmosphere from the Earth's surface. This process traps the heat from sunlight at, or close to, the Earth's surface and significantly raises the average temperature of the planet. Many gases exhibit such "greenhouse" properties, including some that occur naturally in the atmosphere (water vapor, carbon dioxide, methane, and nitrous oxide) and an array of largely manufactured chemicals.

Other gases have so-called "indirect effects" on global warming, because they may contribute to the buildup or decomposition of other greenhouse gases in the atmosphere. For instance, some urban air pollutants (nitrogen oxides and nonmethane volatile organic compounds) react in the presence of sunlight to create ozone (O_3), which is also a greenhouse gas. Sulfur dioxide may have a net cooling effect by promoting cloud formation, while chlorofluorocarbons and hydrochlorofluorocarbons have a direct warming effect that is partially or fully offset by an indirect cooling effect caused by their propensity to destroy ozone in the stratosphere.

Atmospheric concentrations of several important greenhouse gases (carbon dioxide, methane, nitrous oxide, and most halogenated substances) have been increasing rapidly for many years. The growth in their concentrations is believed to be caused by human activities—particularly by the burning of fossil fuels and by deforestation. In recent years, some scientists and policymakers have become concerned that the atmospheric buildup of greenhouse gases may increase the share of the sun's heat retained in the atmosphere, which in turn may affect the Earth's climate in uncertain but potentially disruptive ways.

Some greenhouse gases are more effective in trapping reflected infrared radiation than others. Policymakers need to know on which gases their efforts should be concentrated, and scientists working with the Intergovernmental Panel on Climate Change (IPCC) have engaged in efforts to develop an index of the relative marginal heat-trapping capacities of various greenhouse gases. This index, called a "global warming potential" (GWP), is intended to measure the marginal direct radiative forcing potential of greenhouse gases. GWPs are calculated on the basis of the radiative forcing ability of a unit of carbon dioxide, which is set equal to 1, integrated over periods of 20, 100, and 500 years.

The IPCC periodically revises its GWP calculations. The table below shows the most recent (1995) 100-year GWPs for some of the most important greenhouse gases. The IPCC indicates that the typical uncertainty for these estimates is ±35 percent.

Numerical Estimates of 100-Year Global Warming Potential Relative to Carbon Dioxide

(Carbon Dioxide = 1)

Gas	100-Year Global Warming Potential*
Carbon Dioxide	**1**
Methane	**21**
Nitrous Oxide	**310**
Halogenated Substances	
HFC-23	11,700
HFC-32	650
HFC-41	150
HFC-43-10mee	1,300
HFC-125	2,800
HFC-134	1,000
HFC-134a	1,300
HFC-143	300
HFC-143a	3,800
HFC-152a	140
HFC-227ea	2,900
HFC-236fa	6,300
HFC-245ca	560
Chloroform	4
Methylene Chloride	9
Perfluoromethane	6,500
Perfluoroethane	9,200
Perfluoropropane	7,000
Perfluorobutane	7,000
Perfluoropentane	7,500
Perfluorohexane	7,400
Perfluorocyclobutane	8,700
Trifluoroiodomethane	<1
Sulfur Hexafluoride	23,900

*The Kyoto Protocol to the Framework Convention on Climate Change adopted 100-year GWPs for the calculation of the carbon dioxide equivalence of greenhouse gases. The uncertainty of the GWP estimates is ±35 percent.

Source: Intergovernmental Panel on Climate Change, *Climate Change 1995: The Science of Climate Change* (Cambridge, UK: Cambridge University Press, 1996), p. 121.

Projects that capture and burn methane can also yield substantial carbon emission reductions. Such benefits accrue when captured methane displaces oil or coal as an energy source, or when reduced landfilling results in the release of less carbon dioxide from aerobic decomposition (in the presence of oxygen). Projects that reduced emissions of perfluorocarbons and sulfur hexafluoride also generated large reductions on a carbon dioxide equivalent basis. Overall, the 130 projects (11 percent) that focused on controlling emissions of gases other than carbon dioxide—excluding chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs)—were responsible for nearly 15 percent of the total carbon dioxide equivalent reductions reported. Despite the large reductions reported. No carbon dioxide equivalent reduction was calculated for CFCs and HCFCs because of the uncertainty associated with their net warming potential.[3] The carbon dioxide equivalent of the total emission reductions and carbon sequestration reported for all projects has more than doubled from 73.5 million metric tons in 1994 to 165.6 million metric tons in 1997 (Table 5).

Voluntary Reporting and National Emissions Trends

Emission mitigation projects reported for 1997 indicate total reductions of 165.6 million metric tons carbon dioxide equivalent. An important question is whether the reported emission reductions can be reconciled with the total national emissions levels, which are rising at an annual rate of 50 to 100 million metric tons carbon dioxide equivalent.

In fact, the voluntary reporting database and the national emissions estimates reflect two different accounting frameworks. The national inventory calculates emissions based largely on energy consumption. Year-to-year comparisons thus reflect trends in energy production and consumption.

On the other hand, voluntary reporting data are not necessarily related to historical experience. Most reporters estimate emission reductions by comparison with a hypothetical baseline—what emissions would have been had the mitigation effort not been undertaken. Reporters can estimate reductions even for projects that involve new activities for which no historical records exist. Successful projects may only reduce the growth rate of emissions. Similarly, an entity whose customer base is growing may report reduction actions that only slow a rise in emissions. Thus, it is possible to observe both specific emission mitigation successes and rising levels of national emissions.

Several other factors complicate the interpretation of data on emission mitigation efforts. Many actions have both direct and indirect effects on emissions, and the scope of project accounting may ignore indirect increases associated with a project's implementation. Thus, the shutdown of a coal-fired power plant could save direct emissions for a reporter which, in some measure, might be offset if replacement power were supplied by a nonreporting emitter.

Even if a project is unambiguous in its effect, the responsibility for its implementation may not be. Is the entity capturing methane from a landfill the mitigating agent,

Table 5. Summary of Project-Level Emission Reductions and Carbon Sequestration, Data Years 1994-1997
(Metric Tons Carbon Dioxide Equivalent)

Gas	1994	1995	1996	1997
Carbon Dioxide	66,217,993 (R)	118,634,468 (R)	116,649,424 (R)	141,487,882
Methane	3,197,079 (R)	23,861,796 (R)	34,015,736 (R)	19,633,032
Nitrous Oxide	584,811 (R)	200,752 (R)	201,580 (R)	224,529
PFCs	3,448,668	3,192,463	3,604,265	3,673,641
Other Gases	89,950 (R)	208,850 (R)	-57,612 (R)	556,345
Total	**73,538,501 (R)**	**146,098,329 (R)**	**154,413,394 (R)**	**165,575,429**
CFCs, HCFCs, and Methyl Chloroform	357,919 (R)	20,467,843 (R)	2,478,691 (R)	80,864

(R) = revised.

Notes: Totals include all emission reductions reported. No attempt has been made to correct for double counting, where more than one entity has (or may have) reported on the same emission reduction project. "Other Gases" includes SF_6 and HFCs. CFCs and HCFCs are not included in the totals because of the uncertainty associated with estimates of their net global warming potential. Their direct warming effects (radiative forcing) are offset by indirect cooling effects (destruction of stratospheric ozone, another greenhouse gas). For the same reason, methyl chloroform has been excluded from the "Other Gases" category. The values shown for CFCs, HCFCs, and methyl chloroform reflect direct warming effects only. Totals may not equal sum of components due to independent rounding.

Source: Energy Information Administration, Forms EIA-1605 and EIA-1605EZ.

[3]For a detailed discussion of the global warming potential of CFCs and HCFCs, see Intergovernmental Panel on Climate Change, *Climate Change 1995: The Science of Climate Change* (Cambridge, UK: Cambridge University Press, 1996).

or is it the utility that promises to purchase the methane as fuel (thereby justifying investment in recovery equipment)? Multiple sponsorship of individual projects can lead to double reporting of emission savings when *pro rata* contributions to project implementation cannot be readily identified and adjusted.

Still another consideration affecting interpretation of reduction reports relates to the selection bias inherent in voluntary reporting. Reporters participate in order to share data on successes. Many nonreporters may have successes to report as well. Even more important, however, is the fact that the nonreporters include organizations with no reductions or with increasing emissions of greenhouse gases.

How then does the voluntary reporting of emission mitigation efforts help to address the national problem of rising levels of greenhouse gas emissions? The establishment of an accounting framework for enterprises to assess emissions sources and options for reductions helps provide a new metric for decisionmakers reviewing the consequences of actions taken. Heightened awareness can set the stage for emission avoidance or mitigation. The program can help promote activism and innovation in the search for emission reduction strategies in at least three ways:

- *Replicating small projects on a large scale*. Many projects achieve modest emission reduction benefits individually, but are widely applicable. One major utility described how videoconferencing reduced employee travel between its various locations for meetings. Although the reduction in emissions resulting from the decrease in vehicle miles traveled was not extraordinary, if it were multiplied by even a fraction of the number of companies across the United States that are similarly geographically dispersed, a substantial aggregate benefit could be produced. By sharing information on such projects, voluntary reporting can promote replication of cost-effective emission mitigation measures.
- *Enhancing project scale through pooling of resources*. Organizational initiatives in which several participants pool resources can enhance the scale of the projects undertaken. For example, 40 different electric utilities are jointly sponsoring a forestry project in Belize that will enhance carbon sequestration through improved forest management techniques on 120,000 acres. Voluntary reporting promotes such collaborations by providing recognition to the participating companies.
- *Identifying reduction opportunities*. Through the accounting of emissions performance records necessary for voluntary reporting, reporters gain an understanding of the greenhouse gas emissions consequences of their activities, which enables them to identify the most cost-effective reduction opportunities. The realization that the global warming potential of sulfur hexafluoride is nearly 24,000 times that of carbon dioxide spurred at least one reporter to halve its emissions of this gas.

If the Voluntary Reporting of Greenhouse Gases Program assists in any of these dimensions, it will have made a useful contribution to national environmental objectives.

Recent Policy Developments

The Kyoto Protocol to the Framework Convention on Climate Change, negotiated in December 1997, established binding national greenhouse gas emissions targets for 39 industrialized countries. (Although the United States has signed the Kyoto Protocol, it has not yet been submitted to the Senate for ratification, and the Protocol has not yet entered into force.) To meet the targets established under the Framework Convention on Climate Change, the Administration proposed to reward organizations taking early, voluntary action to reduce emissions.[4] Several groups have proposed alternative programs that would offer credits for early emission reductions.[5] In October 1998, the President's Council on Sustainable Development published a description of "principles" for a credit for early action bill.[6] In this year's State of the Union Address, President Clinton reaffirmed his support for rewarding companies that take early, voluntary action to reduce greenhouse gas emissions.[7]

The interest shown in the concept of credit for early action also stimulated increased interest in the Voluntary Reporting Program. During 1998, the U.S. General Accounting Office issued two reports based on the work of the Voluntary Reporting Program. The first was a

[4]Office of the Press Secretary, The White House, "Press Briefing by Chair of the National Economic Council Gene Sperling, Assistant to the President for International Economic Policy Dan Tarullo, Deputy National Security Advisor Jim Steinberg, Staff Secretary Todd Stern, Chair of Council on Environment Quality Katie McGinty, and Deputy Secretary of Treasury Larry Summers" (Washington, DC, October 22, 1997).

[5]Early reduction proposals issued by the Environmental Defense Fund, Coalition to Advance Sustainable Technology, Center for Clean Air Policy, Resources for the Future, and Niagara Mohawk Power Corporation were evaluated in Robert R. Nordhaus and Stephen C. Fotis, *Analysis of Early Action Crediting Proposals* (Washington, DC: Pew Center on Global Climate Change, October 1, 1998), http://www.pewclimate.org/report1.html.

[6]President's Council on Sustainable Development, Climate Task Force, *Principles for Early Action* (Washington, DC, October 1998).

[7]President William Jefferson Clinton, State of the Union Address, January 1, 1999 (White House Press Release).

summary presentation on the results of the program. The second was an analysis of some emissions accounting issues encountered by the Voluntary Reporting Program that may be relevant to the design of a credit for early reduction program.[8]

In October 1998, Senators Chafee (R-RI), Mack (R-FL), and Lieberman (D-CT) introduced a bill to authorize the President to enter into agreements to provide regulatory credit for voluntary early action to mitigate greenhouse gas emissions.[9] Senator Chafee reintroduced a modified version of the bill in early 1999 with several additional cosponsors.[10] The current bill proposes to provide credit, usable in a possible future domestic regulatory program that would limit greenhouse gas emissions, for voluntary actions taken before such a regulatory program comes into effect.

The proposed legislation provides that an "early action agreement" between the U.S. Government and an organization "may provide that a participant shall be entitled to receive" credits for reductions reported to the Voluntary Reporting Program for the period 1991-1998 if the report was received before January 1, 1999, and the reporter provided "information sufficient to verify, to the satisfaction of the President . . . that actions reported . . .

(A) have been accurately reported;

(B) are not double-counted; and

(C) represent actual reductions in greenhouse gases or actual increases in net carbon sequestration."[11]

On April 28, 1999, Senators Murkowski (R-AK), Hagel (R-ND), Byrd (D-WV), and seven other Senators introduced S. 882, the "Energy and Climate Policy Act of 1999." The bill contains several provisions. One section would amend Section 1605(b) of the Energy Policy Act to:

- Expand the list of statutory reportable actions under the program
- Enhance public recognition of reporters
- Direct the Department of Energy to conduct a review of the program's reporting guidelines with a view to improving the accuracy and reliability of reporting, and encouraging the participation of small businesses and farmers
- Require the Department of Energy to promulgate revised Voluntary Reporting guidelines within 18 months.

Consideration of these proposals by the 106th Congress may lead to other proposals or amendments.

[8]U.S. General Accounting Office, *Climate Change: Basic Issues in Considering a Credit for Early Action Program*, GAO/RCED-99-23 (Washington, DC, November 1998), http://www.gao.gov/AIndexFY99/abstracts/rc99023.htm.

[9]"Credit for Voluntary Early Reduction Act," S. 2617, 105th Congress (October 10, 1998), http://thomas.loc.gov.

[10]"Credit for Voluntary Reductions Act," S. 547, 106th Congress (March 4, 1999), http://thomas.loc.gov.

[11]"Credit for Voluntary Reductions Act," S. 547, 106th Congress (March 4, 1999), Section 5(d)(2), http://thomas.loc.gov.